Thermophysical Properties of 1,1,1,3,3-Pentafluorobutane

A.P. Fröba and K. Krzeminski
Lehrstuhl für Technische Thermodynamik (LTT), Universität Erlangen-Nürnberg, Erlangen, Germany

A. Leipertz [C, S]
Lehrstuhl für Technische Thermodynamik, Universität Erlangen-Nürnberg, Erlangen, Germany

This work presents an experimental study on various thermophysical properties of a new fluoroalkane, 1,1,1,3,3-pentafluoro-butane (R365mfc), which is used as a liquid foaming agent for plastics, e.g., for the production of polyurethane rigid foams for insulation purposes. The thermal conductivity of R365mfc was measured in the liquid phase near saturation conditions at temperatures between 263 K and 333 K using a parallel plate instrument with an uncertainty of better than 5 %. For the measurement of the saturated liquid and vapor densities between 273 K and 353 K a vibrating tube method was used. The uncertainty of the density measurement is less than 0.1 %. In addition, experimental data are presented for R365mfc under saturation conditions over a wide temperature range from about 253 to 373 K using light scattering techniques. Light scattering from bulk fluids has been applied for measuring both the thermal diffusivity and the sound velocity in the liquid and vapor phases. Light scattering by surface waves on a horizontal liquid-vapor interface has been used for the simultaneous determination of surface tension and kinematic viscosity of the liquid phase. With the light scattering techniques uncertainties of smaller than 1.0 %, 0.5 %, 1.0 %, and 1.2 % have been achieved for the thermal diffusivity, sound velocity, kinematic viscosity, and surface tension, respectively. The results for R365mfc are discussed in detail in comparison to the data available in the literature.